PEACE/WILLISTON
FISH & WILDLIFE
COMPENSATION
PROGRAM

BC hydro

BRITISH
COLUMBIA

A Reconnaissance Survey Of Connaghan Lake

M. J. Hunter
March 1997

PWFWCP Report No. 149

105-02887/

The Peace/Williston Fish & Wildlife Compensation Program is a cooperative venture of BC Hydro and the provincial fish and wildlife management agencies, supported by funding from BC Hydro. The Program was established to enhance and protect fish and wildlife resources affected by the construction of the W.A.C. Bennett and Peace Canyon dams on the Peace River, and the subsequent creation of the Williston and Dinosaur Reservoirs.

Peace/Williston Fish and Wildlife Compensation Program, 1011 Fourth Ave. 3rd Floor, Prince George B.C. V2L 3H9

Website: *www.bchydro.bc.ca/environment/initiatives/pwcp/*

This report has been approved by the Peace/Williston Fish and Wildlife Compensation Program Fish Technical Committee.

Citation: M. J. Hunter. March 1997. A reconnaissance survey of Connaghan Lake. Peace/Williston Fish and Wildlife Compensation Program, Report No. 149. 29pp plus appendices.

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A RECONNAISSANCE SURVEY OF

CONNAGHAN LAKE

(FORMERLY GAFFNEY LAKE # 1)

WATERSHED:	**Williston Reservoir (Parsnip Reach)**
DATE OF SURVEY:	**July 25 - 26,1996**
FIELD CREW LEADER:	**Mark Hunter**
FIELD ASSISTANT:	**Karin Mathias**
REPORT PREPARED BY:	**Mark Hunter**

BRITISH COLUMBIA CONSERVATION FOUNDATION

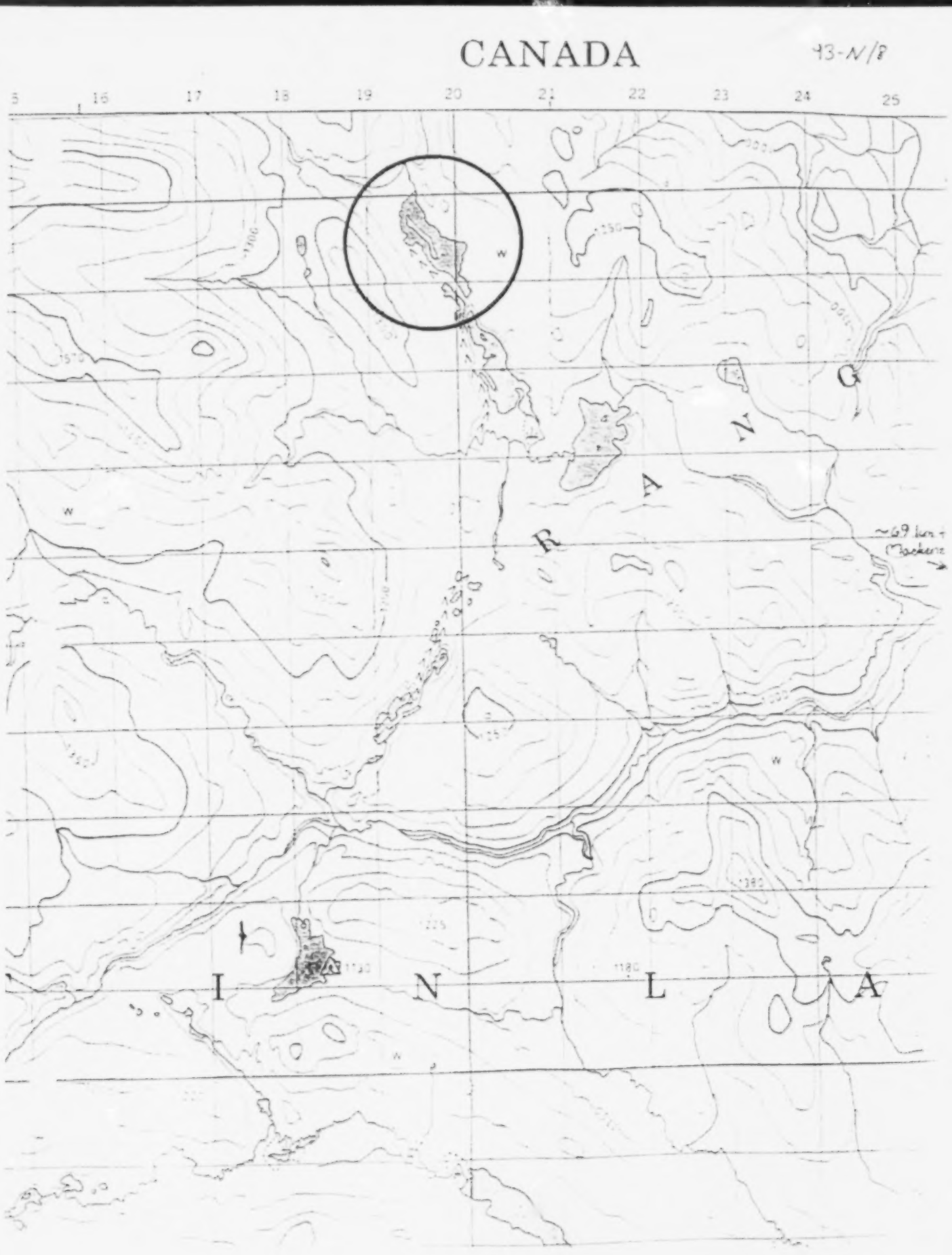
PEACE / WILLISTON FISH AND WILDLIFE COMPENSATION PROGRAM

B. C. MINISTRY OF ENVIRONMENT, LANDS AND PARKS

FUNDED BY: FOREST RENEWAL BRITISH COLUMBIA

RELEASED BY: _____

D. J. Cadden, Regional Fisheries Biologist


CANADA
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LAKE: Gaffney Lake #1 **SYSTEM NAME:** Manson River

A.S.A.P. REFERENCE NO.: **WATERSHED CODE:** 230-9167-487

DATA ON FILE FOR THIS SURVEY

Location	X	Dissolved 02 / Temp. Profiles	X
Physical Data	X	Winter Dissolved 02 / Temp. Profiles	--
Bench Mark	X	Netting Record	X
Terrain Features	X	Lake Catch Summary	X
Access	X	Individual Fish Data	--
Resorts and Campsites	X	Fish Preserved	--
Other Developments	X	Stomach Analysis	--
Obstructions and Pollutions	X	Scale Reading	--
Special Restrictions	X	Location of Inventory Sites	X
Aquatic Plants	X	Photograph Directory	X
Wildlife Observations	X	Appendices	
Miscellaneous Comments	X	A: Water Chemistry Analysis	X
Lake Drainage	X	B: Tributary Stream Data	X
Fisheries Management Comments	X	C: Fish Scale Analysis	--
History of Previous Surveys	X	Bathymetric Map Reduction	X
Water Chemistry Summary	X	Bathymetric Map	--

LOCATION

Location: approximately 76 km west-northwest of Mackenzie

Elevation:	1125 m ± 25 m	U.T.M.:	10.419581.6150048
Latitude / Longitude:	55°29'24" 124°16'26"	N.T.S. Map No.:	93 - N / 8
Management Unit:	7-28	Biogeoclimatic Zone:	Sub-Boreal Spruce
Ecoprovince:	Sub-Boreal Interior	Ecoregion:	Fraser Basin
Ecosection:	Babine Uplands		

Drainage: Unnamed C. - Connaghan C. --> Manson R. --> Williston Reservoir (Parsnip Reach) --> Peace R.

PHYSICAL DATA

Lake Drainage Area:	1.9 km^2	Volume:	1 526 344 m^3
Water Surface Area:	321 369 m^2	Perimeter of Islands:	1 345 m
Area Above 6 m Contour:	181 127 m^2	Number of Islands:	1
Shoreline Perimeter:	3 667 m	Mean Depth:	5.3 m
Maximum Depth:	20.9 m	Secchi Reading:	8.8 m
Filterable Residue (TDS):	70 mg/L		

Sounding Device: Lowrance X-15 Elevation Source: Contour Interpolation

BENCHMARK

(Iron spike, center of red circle) located 2.0 m above present water level in a 27 cm diameter lodgepole pine tree that is 3.15 m from the present water's edge and located on the northeast side of the lake approximately half way between the outlet and Inlet # 1 (Plate # 4).

High Water Mark: 0.22 m above water level at time of survey

LAKE: Unnamed Lake (Gaffney Lake # 1)

TERRAIN FEATURES

Immediate Shoreline:

The two marsh areas on Gaffney Lake # 1, located on the northwest shore around to the middle of the west shore and in the east bay, are covered by sphagnum moss, sedge grasses and willows growing on a low slope. The rest of the lake's shoreline is fronted by a growth of sedge grasses and alders with lodgepole pine and spruce trees growing behind on a moderately steep slope, except for the southwest side of the southeast bay which has a very steep slope. The island is fronted by a growth of sedge grasses and alders with spruce and lodgepole pine trees growing behind on a steep slope.

The shoreline substrate is predominately fines and gravels covered by organics, with some cobbles found along the steeper sloped sections of Gaffney Lake # 1. There is a large amount of large woody debris found along most of the shoreline; the exceptions are in front of the marsh areas which contain very little large woody debris. As well, there are large bed of yellow waterlilies (Nuphar sp.) in front of the marsh in the east bay. The lake's bottom drops off slowly along the north, northwest and west sides of Gaffney Lake, and also in front of the marsh in the east bay. There is also a slow drop off to the lake's bottom along the northwest shore of the island. Around the rest of the lake and the island, the lake's bottom drops off rapidly.

Surrounding Country:

Gaffney Lake # 1 is surrounded by a mature forest of lodgepole pine and spruce trees with some fir trees mixed throughout. Steep hills are located to the southwest and northwest, while rolling hills are found to the north, northeast, and south. To the southeast and east, the land is relatively flat with large hills in the distance. An Unnamed Lake (Gaffney Lake # 2) is found to the south. To the southeast, there are two more Unnamed Lakes (Gaffney Lakes # 3 and # 4). Gaffney Lake # 1 is situated within the SubBoreal Spruce biogeoclimatic zone.

LAKE: Unnamed Lake (Gaffney Lake # 1)

ACCESS

Directions:

From the junction of Highway 27, the Teardrop Forest Service Road and the Germansen Landing North Road, drive north for approximately 100 km, then continue on for approximately an additional 48 km on the Thutade Forest Service Road. At this point, there is an emergency landing strip that can be used for a helicopter landing site. Gaffney Lake # 1 is an approximate 6 km helicopter ride west of the emergency landing strip.

Road Type and Conditions:

Germansen Landing North road and the Thutade Forest Service Road are both well-maintained, two-lane gravel roads that are easily accessible with two-wheel drive vehicles. Logging trucks can be active on both of these roads.

Restrictions:

None known.

RESORTS AND CAMPSITES

There are no resorts or campsites on Spring Lake

OTHER DEVELOPMENTS

None noted.

OBSTRUCTIONS AND POLLUTIONS

There is large bed of yellow waterlilies u Nuphar sp.) growing in the east bay that is hard for a motor boat to pass through because the plants get caught in the propeller. There is also a large amount of large woody debris found along most of the shoreline that could be hazardous to boaters.

LAKE: Unnamed Lake (Gaffney Lake # 1)

SPECIAL RESTRICTIONS

None known.

AQUATIC PLANTS

The following aquatic plants were identified during the time of the survey:

yellow waterlily (Nuphar sp.)
claspingleaf pondweed (Potamogeton richardsonii)
periphyton (Plate # 5)
Equisetum sp.
sedge grasses
eel grass

WILDLIFE OBSERVATIONS

The following wildlife or signs were seen during the time of the survey:

2 common loons
1 bald eagle
moose tracks and droppings

MISCELLANEOUS COMMENTS

1) There is a good location for a Forest Recreation Site on the east shore of the southeast bay of Gaffney Lake # 1. A Forest Recreation Site at this location could be used to service both this lake and the Unnamed Lake (Gaffney Lake # 3) found to the southeast.

2) A large amount of Gammerus and other aquatic invertebrates were seen throughout the water column.

3) Bathymetric map: The lake outline was drawn from an enlargement of air photo 30 BCB 94017: No. 264, flown on June 22, 1994.

LAKE: Unnamed Lake (Gaffney Lake # 1)

LAKE DRAINAGE

General:

Four inlets and five seasonal inlets feed Gaffney Lake # 1. The lake is drained to the northwest by an unnamed creek that flows approximately 0.4 km, then joins with Connaghan Creek, which flows approximately 7.85 km to it's confluence with the Manson River.

Major Systems:

There are no major systems.

Minor Systems:

Inlet # 1 - Unnamed Creek

Inlet # 1 enters Gaffney Lake # 1 through the marsh in the east bay (Plate # 6). The first 40 m of the creek has an average wetted width of 2.5 m and depth of 0.6 m. The substrate is silts and organics with eel grass growing on the creek bottom. Approximately 40 m upstream from the lake, there is a 1.5 m high and 30 m long beaver dam that has willows growing on the top (Plate # 7). Water flows over the top of the dam in a few places, but probably not enough to allow for upstream fish passage. The pond on the upstream side is approximately 20 m by 15 m. Approximately 60 m upstream from the lake, the channel splits into three. Each of the sub-channels has a beaver dam ranging from 1 m to 2 m high on it just upstream of the point where the main channel splits.

The channel to the right (looking upstream) contains most of the flow. This channel is heavily braided for 10 m upstream of the beaver dam, redefines itself for 20 m, then becomes heavily braided again. The substrate is silts and organics. The banks are covered in sedge grasses and willows. Inlet # 1 had no fisheries potential during the survey period.

Inlet # 2 - Unnamed Creek

Inlet # 2 enters Gaffney Lake # 1 from the west at a point halfway along the west shore (Plate # 8). Approximately 4 m upstream from the lake, the channel goes underground for 1 m. Approximately 6 m upstream, the creek forms a pool 4 m long and 2.5 m across. Upstream of this point, the channel has an average wetted width of 0.5 m and depth of 0.05 m. Silts and mosses forms the substrate to the creek. Inlet # 2 had no fisheries potential during the survey period.

LAKE: Unnamed Lake (Gaffney Lake # 1)

Inlet # 3 - Unnamed Creek

Inlet # 3 has two channels that enter the lake in the northwest corner. These channels come together approximately 156 m upstream of the lake. The first 2 m of the main channel (on the right looking upstream) has a substrate composed of large and small gravels. There is a 0.7 m high falls located approximately 2 m upstream from the lake; there was probably not enough flow over the top of the falls at the time of the survey to allow for upstream fish movement (Plate # 9). Upstream of this falls, the substrate is mainly silts and organics. Approximately 20 m upstream of the lake, there is a second falls that is 0.4 m high and has good flow over the top. Approximately 35 m upstream from the lake, there is a small inlet that drains a moss area that is saturated with water. Approximately 40 m upstream, the channel becomes undefined through a bed of mosses.

The secondary channel (on the left looking upstream from the lake) flows through a channel that varies in wetted width from 0.2 m to 1.0 m with an average depth of 0.03 m. The substrate over the first 12 m is large and small gravel that would be good for spawning habitat; however, there was not enough flow at the time of the survey to allow for spawning to take place. Approximately 12 m upstream of the lake, the substrate turns to mainly silts and organics. Approximately 18 m upstream from the lake, the channel joins with the main part of the creek. Inlet # 3 had no fisheries potential during the survey period.

Inlet # 4 - Unnamed Creek

Inlet # 4 enters Gaffney Lake # 1 on the northwest shore (Plate # 10). The creek has an average wetted width of 0.4 m and depth of 0.05 m, and flows through a moss banked channel. The substrate is composed of silts, organics and some moss. Inlet # 4 had no fisheries potential during the survey period.

Outlet - Unnamed Creek

The outlet creek drains Gaffney Lake # 1 from the north corner (Plate # 11) over a 0.5 m high and 18 m long beaver dam that is probably passable to upstream fish passage. A 20 m long and 15 m wide pond, with an organics over gravels bottom, is formed by a second beaver dam located approximately 20 m downstream of the lake (Plate # 12). This dam is 0.5 m high and 15 m long and has water flowing over it's top in many places, but probably not enough flow to allow for upstream fish movement. Downstream of the second beaver dam, the channel is undefined for 12 m before it forms one distinct channel again. Approximately 55 m downstream of the lake, there is a third beaver dam that is 0.2 m high and 5 m long. For the next 145 m downstream of the third beaver dam, there is good to excellent spawning habitat - areas of gravels with some large woody debris and overhead vegetation. Approximately 200 m downstream of the Gaffney Lake # 1, the creek becomes steeper (gradient of 10%). The substrate contains a lot more cobble and some boulders, which form a series of cascades and falls before it joins with Connaghan Creek approximately 400 m downstream from the lake.

LAKE: Unnamed Lake (Gaffney Lake # 1)

A Stream Survey card was completed for a sample site located approximately 85 m downstream of Gaffney Lake # 1 (Plates # 13 & # 14). The average wetted width is 2.4 m and the average maximum riffle depth is 0.15 m. The substrate is composed of gravels (50%), fines (40%) and small cobble (10%). The creek morphology is mainly run (65%) with some riffle sections (35%), and a gradient of 1.5%. The water temperature at the time of the survey was 16 °C. For additional information, refer to Appendix B.

A second Stream Survey card was completed for sample site located approximately 250 m downstream of the lake (Plates # 15 & # 16). At this point, the average wetted width is 1.1 m and the average maximum riffle depth is 0.16 m. The substrate is gravels (40%), cobbles (30%), boulders (20%) and fines (10%). The creek morphology is dominated by riffles (75%) with a gradient of 10%. The water temperature was 14.5 °C at the time of survey. For additional information, refer to Appendix B.

LAKE: Unnamed Lake (Gaffney Lake # 1)

FISHERIES MANAGEMENT COMMENTS

Although Gaffney Lake # 1 has good spawning habitat along the shoreline in some places and in the outlet creek, and an excellent food supply, the lake is barren. This lake could be stocked in one of two ways. One way would be to establish a resident population of rainbow trout in the lake by transporting some of the rainbow trout from the unnamed lake (Gaffney Lake # 3) located to the southeast over - the two systems are joined by their outlet creeks to the Manson River. The other way would be to populate the lake with lake trout since it is deep enough (20.3 m), and possibly stock whitefish in the lake as well to be used as a food source for the lake trout. If the lake was stocked, putting partial breaches in the beaver dams on the outlet creek would allow for better access to the areas that contain good spawning habitat. Completing a winter oxygen / temperature profile before any stocking takes place would ensure that winter-kill of stocked fish would not occur due to low oxygen levels.

HISTORY OF PREVIOUS SURVEYS

Lake Surveys:

None known.

Other Related Studies:

None known.

LAKE: Unnamed Lake (Gaffney Lake # 1)

SUMMER OXYGEN / TEMPERATURE DATA

DEPTH (m)	02 (mg/L)	TEMPERATURE (°C)
Surface	8.5	17.2
1.0	8.5	16.5
2.0	8.0	14.5
3.0	9.0	13.0
4.0	9.0	10.6
5.0	8.0	7.5
5.5	6.8	6.5
6.0	6.7	6.0
7.0	6.5	5.6
8.0	6.0	5.4
9.0	5.6	5.2
10.0	5.2	4.9
11.0	5.0	4.8
13.0	4.7	4.7
12.0	4.5	4.7
14.0	4.4	4.6
15.0	4.3	4.5
16.0	4.2	4.5
17.0	4.1	4.5
18.0	3.9	4.5
19.0	3.6	4.5
20.0	1.8	4.5
20.3	Bottom	

LAKE: Unnamed Lake (Gaffney Lake # 1)

WATER CHEMISTRY SUMMARY **Limnology Station No. 1**

Field Conditions:

Date:	July 26, 1996		
Time:	1250 hrs	Air Temperature:	18 °C
Wind Velocity:	0 - 5 km/h	Wind Direction:	from the NW
Cloud Cover:	7 / 10 o.c.	Surface Conditions:	very light ripple
Secchi Disc:	8.8 m	Water Colour:	clear with yellowish tinge

Method Used:

Dissolved Oxygen:	YSI Model 57 Oxygen / Temperature Meter
Water Temperature:	YSI Model 57 Oxygen / Temperature Meter
Air Temperature:	Hand-Held Alcohol Thermometer
pH (field):	Digital pH Pocket Tester
H2S (field):	Hach H2S Field Test Kit
Laboratory Used:	Pacific Environmental Science Center
Water Sampler:	Vertical Alpha Water Bottle (Vandorn)
Metal Sampler:	By Hand; Preserved With 2.0 mL Nitric Acid
Substrate Sampler:	Substrate Sample Not Taken

Water Sample Chemistry: **SEAM Site No.:** E 223155

	Sampling Depths	
	Surface (0.5 m)	Lower (19.5 m)
Alkalinity (lab)	54.6 mg / L	66.5 mg / L
Filterable Residue 105°C (lab)	70 mg / L	70 mg / L
H2S (field)	N/A	0 mg / L
Nitrogen - Total (lab)	0.13 mg / L	0.14 mg / L
Non-Filterable Residue (lab)	< 5 mg / L	< 5 mg / L
pH (field)	5.6	5.6
pH (lab)	7.93	7.40
Phosphorus - Total Dissolved (lab)	0.004 mg / L	0.005 mg / L
Specific Conductance (lab)	112 µS / cm	136 µS / cm

Bottom Depth: 20.6 m

Substrate Sample Depth: N/A

` additional analyzed parameters and results, including metals, are found in Appendix 1

LAKE: Unnamed Lake (Gaffney Lake # 1)

NETTING RECORD

Mesh Size Experimental Order: 25, 76, 51, 89, 38, 64 mm

NETTING SITE # 1

Type:	Sinking Monofilament Gill Net			
Date Set:	July 25, 1996		Time:	1420 hrs
Date Lifted:	July 25, 1996		Time:	1758 hrs
Net Dimensions:	Length:	91.4 m	Depth:	2.4 m
Shallow End Mesh Size:	25 mm		Depth:	1.7 m
			Substrate:	silt over cobbles
Deep End Mesh Size:	64 mm		Depth:	16.0 m
			Substrate:	silt / organics

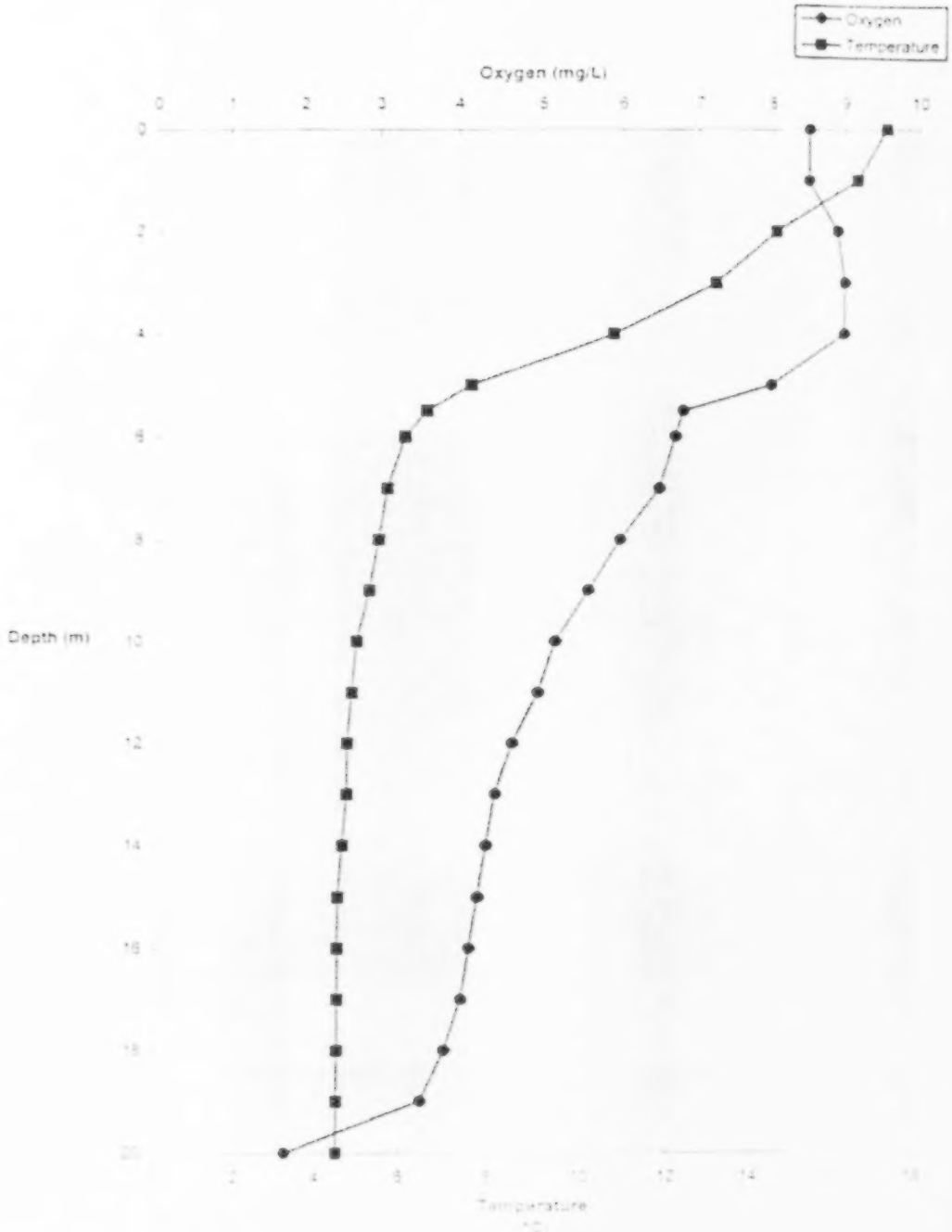
Comments: Net started 7.0 m from the shore. Net was empty.

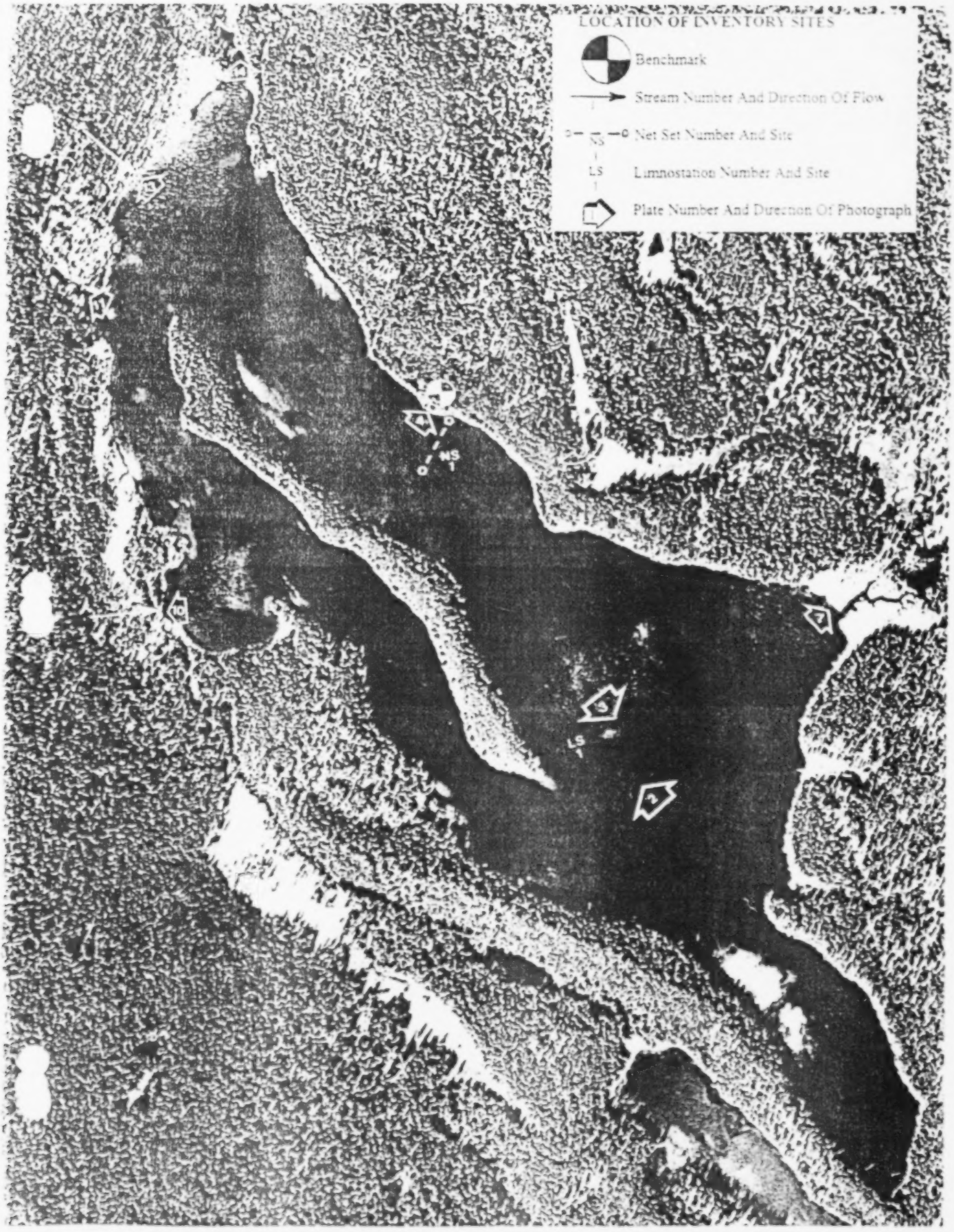
Minnow Traps:

Bait: Sardines

Trap No.	Hours	Depth (m)	Substrate	Species	No. Caught	Size Range (cm)
1	3:39	0.9	organics over sand and gravel	empty	0	-
2	3:39	1.3	gravels / cobbles with periphyton	empty	0	-
3	3:35	0.6	silt / organics with aquatic vegetation	empty	0	-
4	3:40	1.0	silt over gravels	empty	0	-

SUMMER OXYGEN / TEMPERATURE PROFILE




LOCATION OF INVENTORY SITES
Benchmark
Stream Number And Direction Of Flow
NS
Net Set Number And Site
LS
Limnostation Number And Site
Plate Number And Direction Of Photograph
NS 1
LS 1

LAKE: Unnamed Lake (Gaffney Lake # 1)

PHOTOGRAPH DIRECTORY

Plate	Roll : Number	Description
1	10: 23	Aerial view of Unnamed Lake (Gaffney lake # 1) looking south. Note Unnamed Lake (Gaffney Lake # 3) in the background.
2	11: 5 - 7	Panoramic view of Unnamed Lake (Gaffney Lake # 1) looking southeast from the center of the lake.
3	11: 8 -10	Panoramic view of Unnamed Lake (Gaffney Lake # 1) looking northwest from the center of the lake.
4	11: 11	View of the benchmark located 2.0 m above present water level in a 27 cm diameter Lodgepole pine tree that is 3.15 m from the present water's edge and located on the northeast side of the lake approximately half-way between the outlet and Inlet # 1.
5	10: 6	View of a sample of the periphyton that was growing in Unnamed Lake (Gaffney Lake # 1).
6	11: 4	View of the mouth of Inlet # 1 where it enters Unnamed Lake (Gaffney Lake # 1) in the east bay of the lake.
7	10: 8	Upstream view of beaver dam # 1 on Inlet # 1, located approximately 40 m upstream of Unnamed Lake (Gaffney Lake # 1). Dam height is 1.15 m.
8	10: 1	View of the mouth of Inlet # 2 where it enters Unnamed Lake (Gaffney Lake # 1) in the west bay of the lake.
9	10: 5	Upstream view of beaver dam # 1 on Inlet # 3, located approximately 2 m upstream of Unnamed Lake (Gaffney Lake # 1). Dam height is 0.7 m.
10	10:2	View of the mouth of Inlet # 4 where it enters Unnamed Lake (Gaffney Lake # 1) on the north side of the lake.
11	11: 13	View of the mouth of the outlet where it drains Unnamed Lake (Gaffney Lake # 1) to the north.
12	11: 20	Upstream view of the unnamed creek, taken approximately 20 m upstream of it's confluence with the outlet.

13	11: 14	Upstream view of sample site # 1 on the outlet, taken approximately 100 m downstream of Unnamed Lake (Gaffney Lake # 1).
14	11: 15	Downstream view of sample site # 1 on the outlet, taken approximately 75 m downstream of Unnamed Lake (Gaffney Lake # 1).
15	11: 19	Upstream view of sample site # 2 on the outlet, taken approximately 255 m downstream of Unnamed Lake (Gaffney Lake # 1).
16	11: 16	Downstream view of sample site # 2 on the outlet, taken approximately 240 m downstream of Unnamed Lake (Gaffney Lake # 1).

LAKE: Unnamed Lake (Gaffney lake # 1)

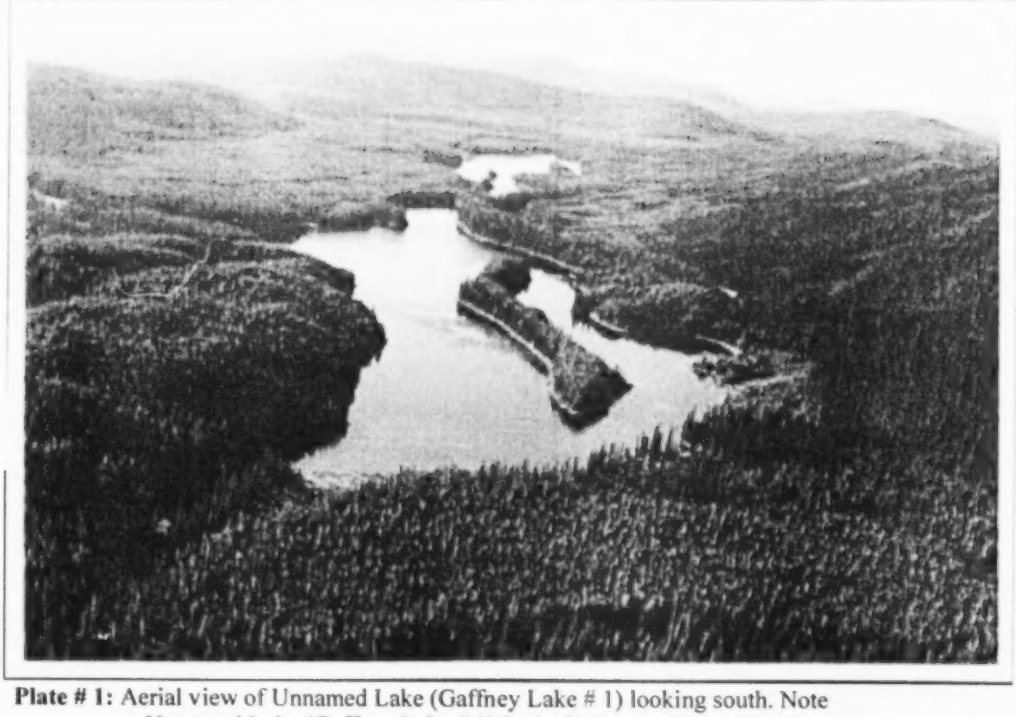


Plate # 1: Aerial view of Unnamed Lake (Gaffney Lake # 1) looking south. Note Unnamed Lake (Gaffney Lake # 3) in the background.

LAKE: Unnamed Lake (Gaffney Lake # 1)

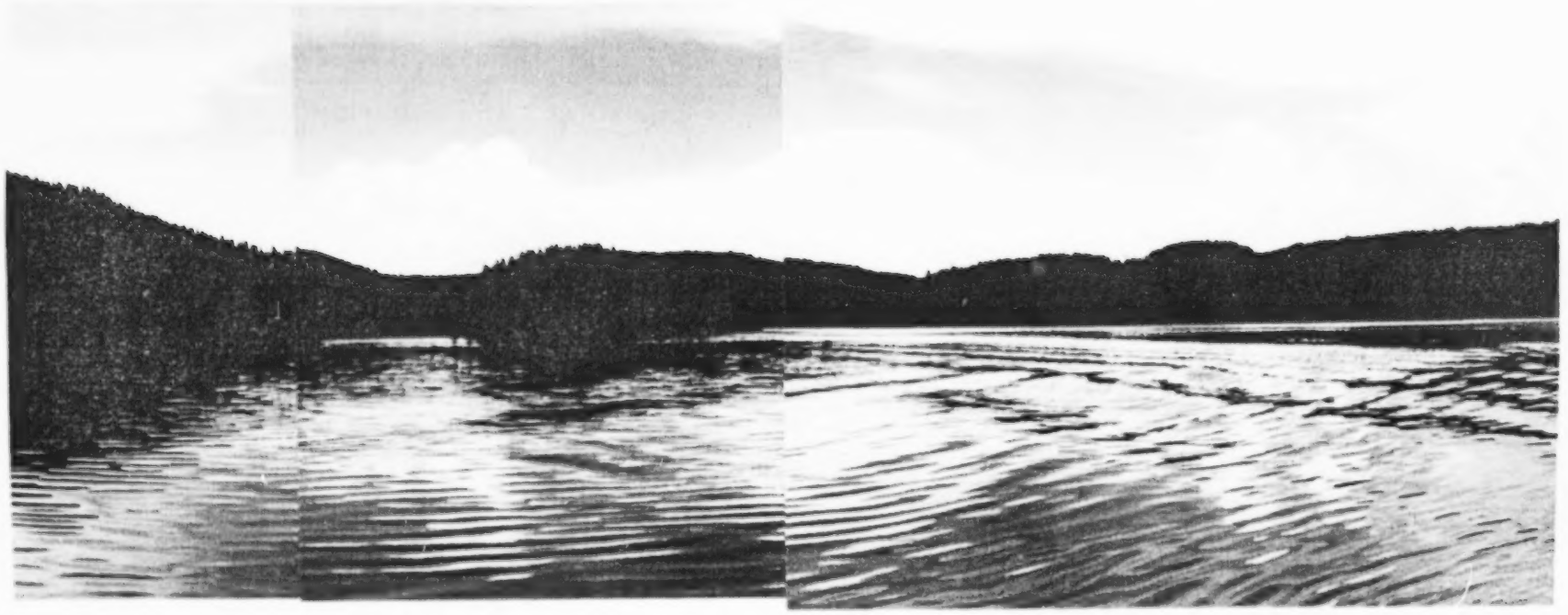


Plate # 2: Panoramic view of Unnamed Lake (Gaffney Lake # 1) looking northwest from the center of the lake.

LAKE: Unnamed Lake (Gaffney Lake # 1)

Plate # 3: Panoramic view of Unnamed Lake (Gaffney Lake # 1) looking southeast from the center of the lake.

Plate # 4: View of the benchmark located 2.0 m above present water level in a 27 cm diameter Lodgepole pine tree that is 3.15 m from the present water's edge and located on the northeast side of the lake approximately half-way between the Outlet Creek and Inlet # 1.

Plate # 5: View of a sample of the periphyton that was growing in Unnamed Lake (Gaffney Lake # 1).

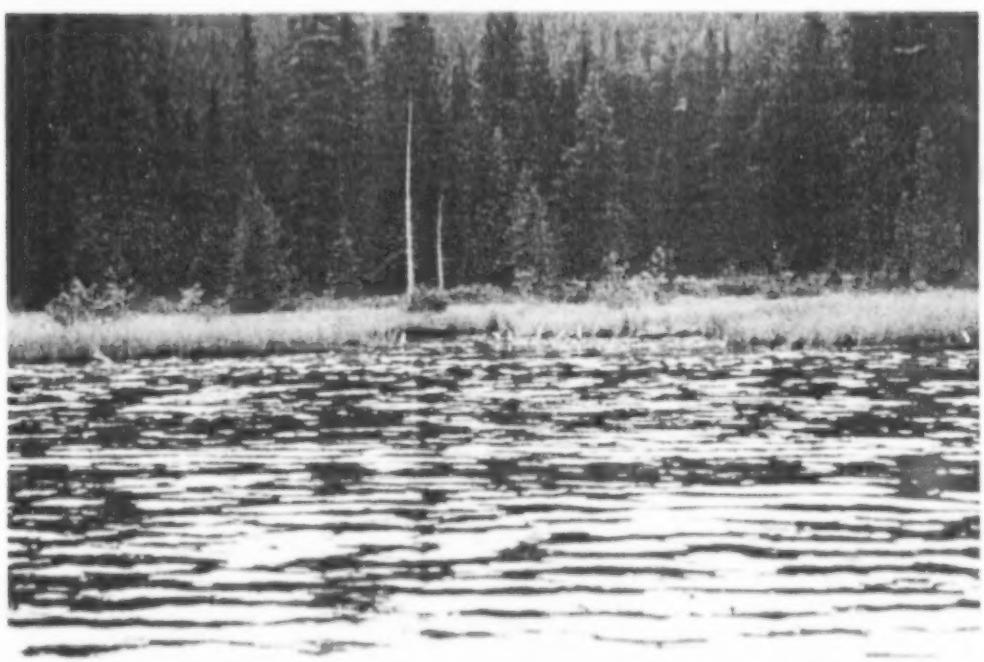


Plate # 6: View of the mouth of Inlet # I where it enters Unnamed Lake (Gaffney Lake # 1) in the east bay.

Plate # 7: Upstream view of beaver dam # 1 on Inlet # 1, located approximately 40 m upstream of Unnamed Lake (Gaffney Lake # 1). Dam height is 1.15 m.

LAKE: Unnamed Lake (Gaffney Lake # 1)

Plate # 8: View of the mouth of Inlet # 2 where it enters Unnamed Lake (Gaffney Lake # 1) in the west bay.

Plate # 9: Upstream view of beaver dam # I on Inlet # 3, located approximately 2 m upstream of Unnamed Lake (Gaffney Lake # 1). Dam height is 0.7 m.

LAKE: Unnamed Lake (Gaffney Lake # 1)

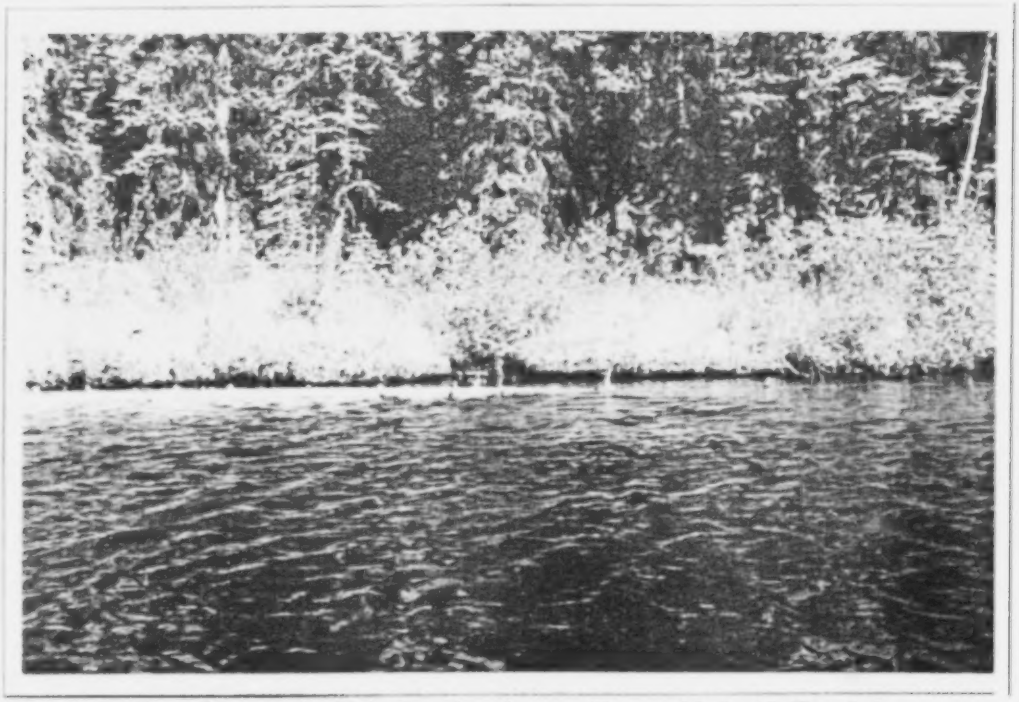


Plate # 10: View of the mouth of Inlet # 4 where it enters Unnamed Lake (Gaffney Lake # 1) on the north side of the lake.

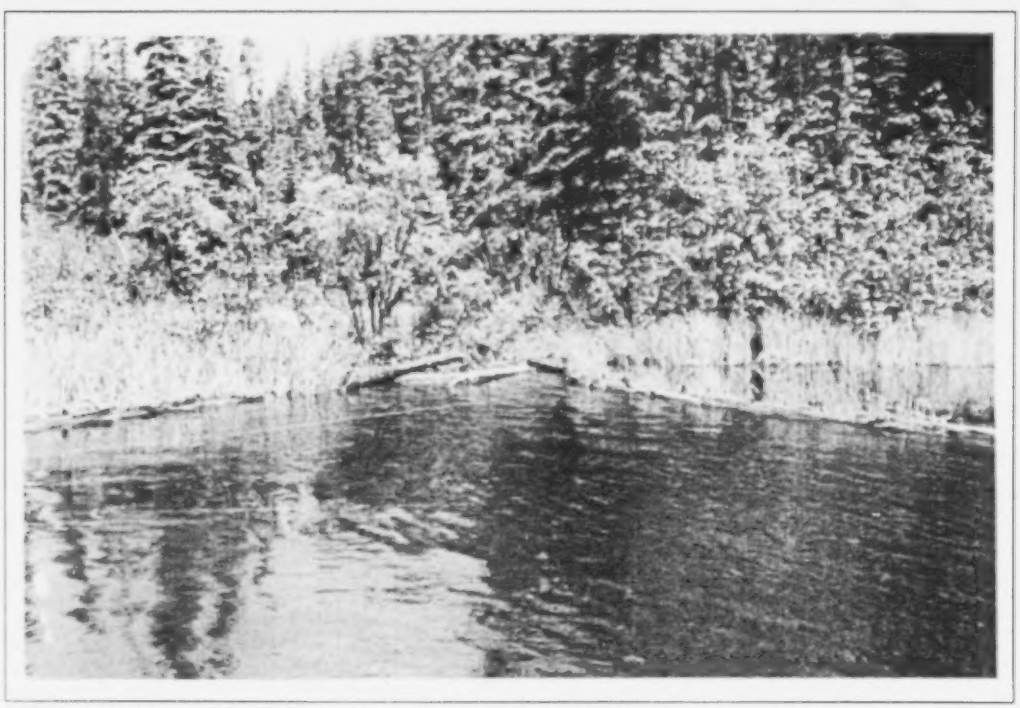


Plate # 11: View of the mouth of the outlet where it drains Unnamed Lake (Gaffney Lake # 1) to the north.

Plate # 12: Upstream view of the unnamed creek, taken approximately 20 m upstream of it's confluence with the outlet.

LAKE: Unnamed Lake (Gaffney Lake # 1)

Plate # 13: Upstream view of sample site # 1 on the outlet, taken approximately 100 m downstream of Unnamed Lake (Gaffney Lake # 1).

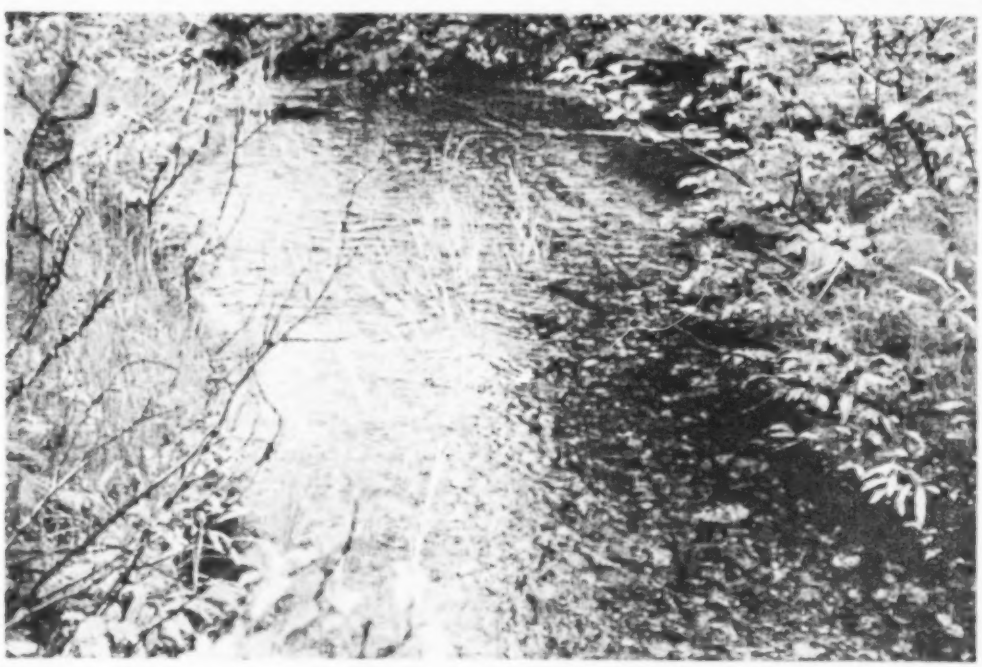


Plate # 14: Downstream view of sample site # 1 on the outlet, taken approximately 75 in downstream of Unnamed Lake (Gaffney Lake # 1).

Plate # 15: Upstream view of sample site # 2 on the outlet, taken approximately 225 m downstream of Unnamed Lake (Gaffney Lake # 1).

Plate # 16: Downstream view of sample site # 2 on the outlet, taken approximately 240 m downstream of Unnamed Lake (Gaffney Lake # 1).

Appendix A

LABORATORY REPORT

Water Chemistry Analysis

RESULTS FOR UNNAMED LAKE-GAFFNEY LK #1 SAMPLES

Parameter Analyzed		Units	963414-001	963414-002
ALKALINITY		mg/l	54.6	66.5
CONDUCTIVITY		uS/cm	112	136
METALS/TOTAL (WATER-ICP)	AG	mg/l	<.01	-
	AL	mg/l	.09	-
	AS	mg/l	<.06	-
	B	mg/l	<.01	-
	BA	mg/l	.014	-
	BE	mg/l	<.001	-
	CA	mg/l	16	-
	CD	mg/l	<.006	-
	CO	mg/l	<.006	-
	CR	mg/l	<.006	-
	CU	mg/l	<.006	-
	FE	mg/l	.158	-
	K	mg/l	.7	-
	MG	mg/l	1.2	-
	MN	mg/l	.008	-
	MO	mg/l	<.01	-
	NA	mg/l	1.1	-
	NI	mg/l	<.02	-
	P	mg/l	<.1	-
	PB	mg/l	<.06	-
	SB	mg/l	<.06	-
	SE	mg/l	<.06	-
	SI	mg/l	3.45	-
	SN	mg/l	<.06	-
	SR	mg/l	.038	-
	TI	mg/l	<.002	-
	V	mg/l	<.01	-
	ZN	mg/l	.002	-
NITROGEN/AMMONIA		mg/l	.008	.003
/NITRITE		mg/l	<.002	<.002
/NITRITE+NITRATE		mg/l	<.002	.011
/TOTAL		mg/l	.13	.14
PH		Rel.U.	7.93	7.40
PHOSPHORUS/O-PO4		mg/l	<.001	.001
/TOTAL		mg/l	.019	.022
/TOTAL DISSOLVED		mg/l	.004	.005
RESIDUE/FILTERABLE		mg/l	70	70
/NON-FILTERABLE		mg/l	<5	<5
BC CLIENT STUDY CODE			20	20
SAMPLING AGENCY			91	91
SITE IDENTIFIER/NUMBER			E223155	E223155
COLLECTION START DATE		y/m/d	96/07/26	96/07/26
UPPER DEPTH		METERS	0.5	19.5
TEMPERATURE ON ARRIVAL		deg.C	10	10

Appendix B

Tributary Stream Data

D.F.O. / M.O.E. Stream Survey Form

DFO / MOE

STREAM SURVEY FORM

Stream Name									Access		Method
Watershed Code											
Location											
Date		Time		Agency		Crew					

C	PARAMETER	VALUE	UNITS	C	BED MATERIAL	%	C	BANK
	Ave. Chan. Width (m)				Fines			
	Ave. Wet. Width (m)				Gravel			
	Ave. Max. Pool Depth (m)				Cobble			
	Ave. Pool Depth (m)				Boulder			
	Gradient %				Bedrock			
	% Pool							
	Side Chan. %							
	Debris							
	Large Woody							
	Other							

DISCHARGE

Method	Value	Units	Specific Data

STREAM VALLEY CROSS-SECTION

PLANIMETRIC VIEW

FISH SUMMARY

C	Species	No.	Size Range (cm)	Life Phase	Est. Method Ref.

COMMENTS

Channel Stability | Debris | Management Concerns | Observations | Risk of Type | Values Met | Processes | Etc.

DFO / MOE

STREAM SURVEY FORM

Stream Name: Unnamed Ck	Local: Outlet to Unnamed Lk (Trib to U)	Access		Method	
Watershed Code		Site No.		Length (m)	
Location: NW 9-7S-5E of Unnamed Lk	Map # 93-N/2	Site No.		Elevation (m)	15
(Easting, Lk #)		Fish Caught	Y	N	Field # / Mus #
Date: Y M D	Time	Agency	Crew		

C	PARAMETER	VALUE	METH	SPECIFIC DATA	OBSTRUCTIONS (m)
	Ave Chan Width (m)	12	ST	10 11 13	C Type Loc'n
	Ave Wet Width (m)	2	ST	10 11 13	
	Ave Max Riffle Depth (m)	.5	ST	1 11 13	
	Ave Max Pool Depth (m)	.25	ST		
	Gradient %	10	TE		
	% Pool: Rif: Run: Other:	25	GE		
	Side Chan %	0	GE		
	Dens: Area %	0	GE		
	Dens: Stems %	0	GE		
	COVER Total %	50	GE		
	Dom Surface Cover:				
	Dom Substrate:	5	10	30	
	Dom Source:				

BED MATERIAL

Fines		10
Gravels		30
Larges		10
Bedrock (at Transect)		

BANKS

L	Undercut	0.2	Overhang	0.1	
	Texture	F	S	G	R

Comments: Dry 25 % UC N/A

Valley Channel Ratio: 1-2 2-5 5-10 10+ N/A

Surface: Dry L M H Flood

Flood Signs: Wash Debris Y N

Bank %: Up Down

Bank Veg: Up Down

DISCHARGE

Parameter	Value	Meth	Meas Date
Wetted Width (m)	2		10 13 13
Mean Depth (m)	.25		10 13 13
Mean Velocity (m/s)	.20	Float	
Discharge (m³/s)	.10	Float	

DEBRIS SUMMARY

Fish

Wood Debris Density Rank: Key Member:

FISH SUMMARY

C	Species	No	Size Range (mm)	Life Phase	Est Method/Ref

STREAM VALLEY CROSS-SECTION

Looking Downstream

L R

PLANIMETRIC VIEW

COMMENTS

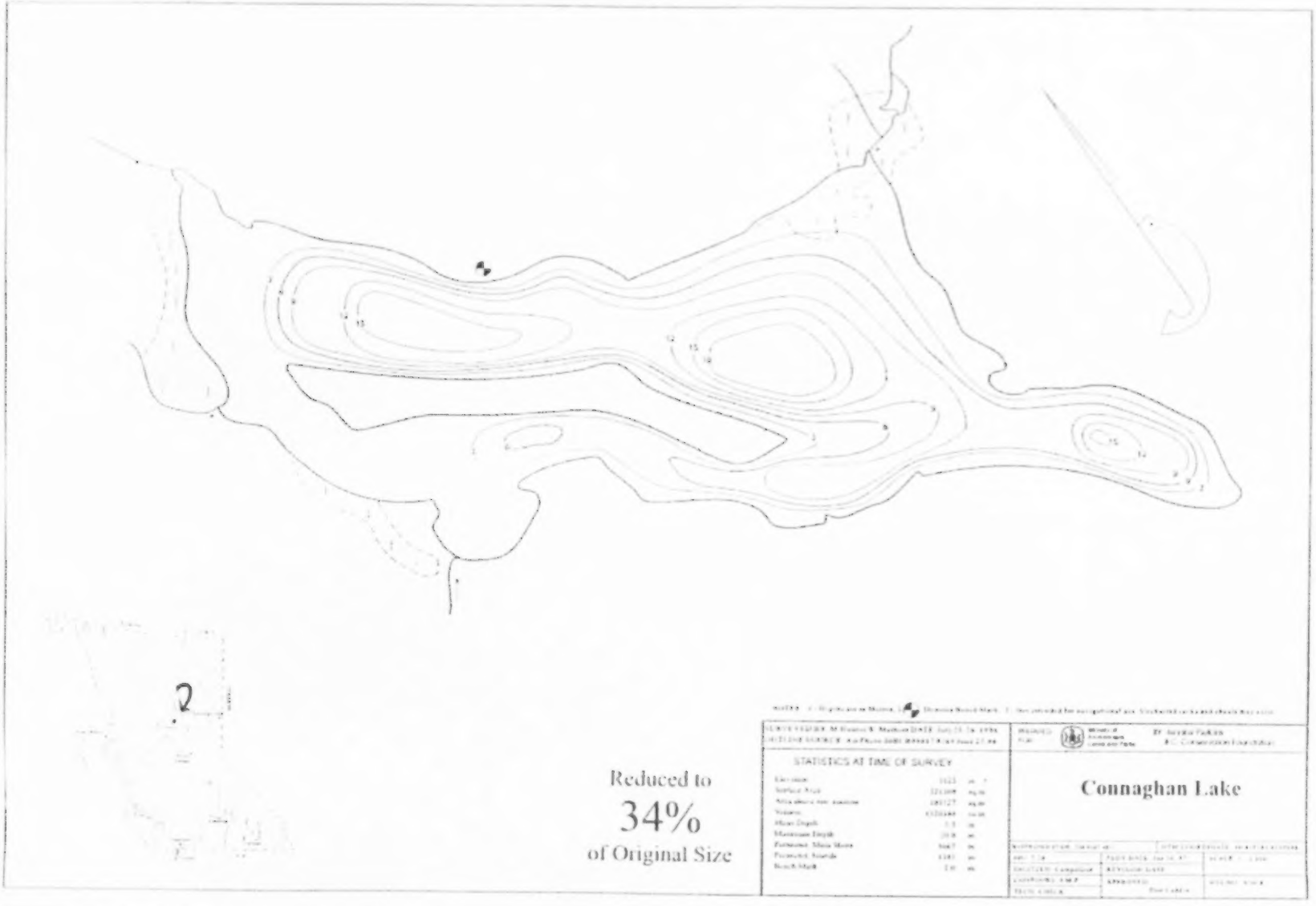
Channel Stability: Debris: Pollutants/Odours: Obstructions: Riparian Zone: Valley Wall Processes: Fish:

1 [illegible]

2 [illegible]

Appendix C

BATHYMETRIC MAP



Reduced to
34%
of Original Size

STATISTICS AT TIME OF SURVEY

Connaghan Lake